

REMARKS

Claims 18-31, 33-36 and 38-44 are presently in the application. Claims 1-17, 32, 37 and 45-47 have been canceled.

The examiner's indication of allowable subject matter in claims 31 and 43-47 is greatly appreciated.

Reconsideration of the rejection of claims 22 and 38-41 under 35 USC 112, second paragraph, is respectfully requested. Claim 19 has been amended to describe the nozzle needle seat (4) as having the shape of a truncated cone having a base surface. Thus, the "base surface" of claim 22 now has a proper antecedent basis. Claims 38-41 have been amended to depend from claim 23, which provides antecedent basis for the recitation of "the blind bore" language in claims 38-41.

This amendment is accompanied by a terminal disclaimer in compliance with 37 CFR 1.321(c). Accordingly, withdrawal of the rejection of claims 18, 19 and 30 under the judicially created doctrine of obviousness-type double patenting over claims 1-3 of US 6,669,117 is requested.

Please charge the terminal disclaimer fee under 37 CFR 1.20(d) to deposit account No. 07-2100.

Claim 18 has been amended to include the language of claim 32 and is now directed to an injection nozzle for internal combustion engines, which has at least one injection orifice, a nozzle needle seat, and a nozzle needle, the improvement wherein the end of the nozzle needle oriented toward the nozzle needle seat has an annular groove, and wherein the width of the annular groove is one-and-a-half times greater

than the diameter of the injection orifice.

To support a rejection of a claim under 35 USC 102(b), it must be shown that each element of the claim is found, either expressly described or under principles of inherency, in a single prior art reference. See Kalman v. Kimberly-Clark Corp., 713 F.2d 760, 772, 218 USPQ 781, 789 (Fed. Cir. 1983), cert. denied, 465 U.S. 1026 (1984).

None of the applied references teaches a nozzle needle wherein the end of the nozzle needle oriented toward the nozzle needle seat has an annular groove with a width one-and-a-half times greater than the diameter of the injection orifice as required by claim 18. Thus, it follows that none of the references applied in last Office action anticipate claim 18 or claims 19-31, 33-36 and 38-44, dependent on claim 18.

Applicant's specification teaches that in the partial stroke range of the nozzle needle, the annular groove in the end of the nozzle needle oriented toward the nozzle needle seat is decisive for the throttle action of the injection nozzle. Since the annular grooves can be reproduced with high precision, there is very little variation in the throttling action of injection nozzles of the same design. For this reason, by measuring the operating behavior of an injection nozzle according to applicant's invention, the operating behavior of all other injection nozzles of the same design can be predicted with significantly greater precision and the control of the injection process can be correspondingly optimized. It is also taught that by providing an annular groove in the end of the nozzle needle oriented toward the nozzle needle seat with a width which is one-and-a-half times greater than the diameter of the injection orifice, the throttle action

of the injection nozzle is influenced by the annular groove over a sufficiently large partial stroke range. Spec., page 6. This advantageous feature is clearly not taught or suggested by any of the applied references.

None of the applied references deals with the problem of the variation in injection quantity. This means that although grooves in the nozzle needle were known, it was the present applicant who discovered that using grooves for the reduction of the variation in injector quantity would be advantageous and it was the present applicant who discovered that providing a groove width one-and-a-half times greater than the diameter of the injection orifice was particularly advantageous.

A particular parameter must first be recognized as a result-effective variable, i.e., a variable which achieves a recognized result, before the determination of the optimum or workable ranges of said variable might be characterized as routine experimentation. In re Antonie, 559 F.2d 618, 195 USPQ 6 (CCPA 1977) (The claimed wastewater treatment device had a tank volume to contractor area of 0.12 gal./sq. ft. The prior art did not recognize that treatment capacity is a function of the tank volume to contractor ratio, and therefore the parameter optimized was not recognized in the art to be a result-effective variable.). See also In re Boesch, 617 F.2d 272, 205 USPQ 215 (CCPA 1980) (prior art suggested proportional balancing to achieve desired results in the formation of an alloy).

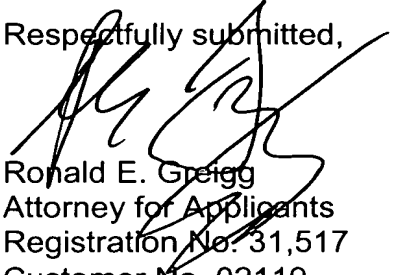
In the present case, none of the applied prior art references recognized that the width of the groove in the end of the nozzle needle in relation to the diameter of the injection orifice was a result-effective variable. Thus, it is improper for the examiner to

conclude that the particular relationship specified in claim 18 between the width of the groove and the diameter of the injection orifice or the dimensions of the groove set forth in claims 25 and 26 is simply the discovery of optimum ranges. The examiner is clearly using the applicant's own teaching in making a rejection under 35 USC 103 which is not permissible.

Entry of the amendment and allowance of the claims is respectfully requested.

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Respectfully submitted,



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